DISFLUENCY CHARACTERISTICS OF A BILINGUAL MANDARIN-ENGLISH SPEAKING CHILD WHO STUTTERS

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# TABLE OF CONTENTS

## INTRODUCTION

- Literature Review ................................................................. 1
  - Defining Bilingualism ......................................................... 3
  - Stuttering Patterns and the Influence of Language in Bilingual Speakers .. 5
  - Identification of Stuttering in Languages Other Than Your Own .......... 7
  - Chinese and English Comparisons ......................................... 8
- Summary and Research Questions ........................................... 10
- Hypothesis ............................................................................. 13

## METHODOLOGY

- Participant ............................................................................. 13
- Data Collection ...................................................................... 15
- Transcription .......................................................................... 16
- Disfluency Identification and Coding ....................................... 17
- Collaboration Considerations ................................................. 18
- Coding Reliability .................................................................. 19
- Analysis .................................................................................. 20

## RESULTS

- Frequency of Stuttering-Like and Total Disfluencies ................. 21
- Proportions of Other Disfluencies and Stuttering-Like Disfluencies ........ 22
- Specific Disfluency Types .......................................................... 22
- Disfluency Clusters .................................................................. 24
- Discussion .............................................................................. 24

## CONCLUSION

- Summary of Findings and Implications ...................................... 26
- Limitations and Future Research ............................................. 28
## APPENDIX  

**A:** Table of all Investigators and Related Research Assistants .................................31  
**B:** Results Tables ............................................................................................................32  
**C:** Mandarin Reliability Disagreements ..........................................................................36  
**D:** Data and Transcription Examples ..............................................................................37  
  - Mandarin Sample ..........................................................................................................37  
  - English Sample ..............................................................................................................38  
  - Data Collection Method ...............................................................................................39  

## LIST OF REFERENCES ......................................................................................................40  

## ABSTRACT .......................................................................................................................45
LIST OF TABLES AND FIGURES

INTRODUCTION .................................................................................................................... 1
  FIGURE 1: Description of Mandarin Tones........................................................................10

METHODOLOGY .................................................................................................................... 13
  FIGURE 2: Sample Size Summary ..................................................................................16
  FIGURE 3: List of Specific Disfluencies.........................................................................18
  FIGURE 4: Coding Reliability Percentages.....................................................................20

APPENDIX A ..........................................................................................................................31
  FIGURE 5: Table of Investigators and Tasks .................................................................31

APPENDIX B ..........................................................................................................................32
  FIGURE 6: Percentage of Stuttering-Like and Total Disfluencies ...............................32
  FIGURE 7: Proportions of SLDs and ODs ..................................................................32
  FIGURE 8a: Specific Disfluency Types: SLD ...............................................................33
  FIGURE 8b: Specific Disfluency Types: OD .................................................................33
  FIGURE 9: Rankings of Specific Disfluency Percentages .............................................34
  FIGURE 10: Disfluency Clusters ....................................................................................35

APPENDIX C ..........................................................................................................................36
  FIGURE 11: Proportion of Disagreements between SLDs and ODs .........................36
LIST OF ILLUSTRATIONS

APPENDIX D .................................................................................................................................37

FIGURE 12: Mandarin Sample ........................................................................................................37
FIGURE 13: English Sample ...........................................................................................................38
FIGURE 14: Data Collection Method..............................................................................................39
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INTRODUCTION

Literature Review

Stuttering is a complex, universal disorder, occurring across languages and cultures, existent in both bilingual and monolingual populations (Van Riper, 1971; Finn & Cordes, 1997; Van Borsel, Maes, & Foulon, 2001). Although known to be a prevalent communication disorder, limited information is available about stuttering in languages other than English (Van Borsel, et al., 2001; Lim, et al., 2008; Roberts, 2011). The previous statement is of particular concern because the number of bilingual speakers is increasing across the world (Lewis, 2009). Ardilo (2011) defines bilingualism as being able to communicate in using two different languages. In the 2004 U.S. Census, 49,632,925 persons (18.7%) reported that they speak a language other than English at home.

There is a need to understand stuttering in other languages. Monolingual clinicians are asked to treat stuttering in languages other than English, including bilingual speakers (Li, 2004; Bebout & Arthur, 1997; Cheng, 1987). The assessment and treatment of communication disorders in children and adults who are bilingual have presented challenges to speech-language pathologists (SLPs) for decades. As a profession, we are ethically responsible to be informed about cultural and social differences in order to provide the most effective services possible. Chinese speakers represent one fourth of the world’s population (Lewis, 2009), and yet very few SLPs are bilingual in Asian languages (Cheng, 1987). In 1987, the American Speech-Language Hearing Association (ASHA) estimated 3.5 million native minority Asian language speakers have speech, language, or hearing disorders that are unrelated to their foreign
language use. These communication disorders require habilitative or rehabilitative services from SLPs, but cross-linguistic competence may impede provision of best ethical services. The projected Asian population in the U.S. is steadily increasing. From 1990 to 2010 the non-Hispanic Asian population doubled from an estimated 7,076 thousand to 14,402 thousand people, and is projected to increase triple fold to 47,498 thousand by the year 2050 (Population by Race and Hispanic Origin: 1990 to 2050, 2010). In the United States alone, there reside 3.8 million Chinese-Americans. This population was the fastest growing ethnic group in the U.S., having increased 46% from the 2000 Census to the 2010 Census. Additionally, 18.7% of the total U.S. population (49,632,925 people) reported speaking a language other than English in the home, including Chinese-Americans. (ASHA, 2011).

The burgeoning population of Asian-Americans living in the U.S necessitates increased knowledge of communication disorders in bilingual populations since they will be the population requiring services from SLPs. Unfortunately, there is a surprising lack of information about the nature of communication disorders in languages other than English, including Chinese.

Stuttering exists in the Mandarin speaking population, and is known to be a universal—and not language specific—problem. Moreover, Mandarin and English are two very different languages with a great language distance between them (Li, 2008). There are over 1.1 billion primary and secondary speakers of Mandarin Chinese in the world; in 1997, it was considered the world's most frequently used language (Weber, 1997; Ardilla, 2011). Comparatively, English was the second most spoken world language, but only had 480 million primary and secondary speakers. English is spoken
in 115 different countries; conversely, Mandarin is spoken only in 5 (Weber, 1997). Specifically, English and Mandarin are the two most spoken languages in the world, yet it is not known how stuttering manifests in English-Mandarin bilinguals.

Increasing interest in the population of bilinguals who stutter (BWS) in recent years has led to more research (e.g., Bernstein Ratner, 2004; Roberts & Shenker, 2006; Van Borsel, et al., 2001). However, information about stuttering in bilinguals who speak both Mandarin and English has been quite limited, particularly in light of pervasive use of the two languages. Furthermore, weaknesses in the research of bilingual stuttering restrict our understanding of stuttering in bilinguals. These weaknesses include weak research designs, failure to define “disfluencies” or “stutters” in sufficient detail for replication and comparison of results across studies, and incomplete descriptions of the language background of participants (Roberts, 2011). While studies of stuttering in languages other than English in recent years have made strides, many results proved inconclusive, and the gap between the existing knowledge of stuttering in English versus stuttering in other languages, as well as of BWS, still remains. This is true for Chinese speakers who stutter, a communication disorder that is observed in this group as often as in English speakers (Bloodstein & Ratner, 2008). This project will shrink this deficit by examining stuttering in a bilingual Mandarin-English speaker.

**Defining Bilingualism**

At the simplest level, being bilingual is being able to speak two languages with the competence of a native speaker (www.dictionary.com). Bilingualism depends on fluency in two languages and use of two languages. Fluency requires the ability to speak both languages easily and naturally, and use constitutes the regular employment of
both languages in everyday communications (Encarta World English Dictionary, 2009).

“Balanced” bilingualism is the notion of having equal proficiency in two languages across a range of social and academic contexts (http://mother-tongue-development.wikispaces.com/). Peal and Lambert (1962) noted the importance of defining and separating bilingualism’s two branches (balanced versus unbalanced) over six decades ago. “Unbalanced” bilingualism is also known as dominant bilingualism. This branch includes bilingual speakers who are more proficient in one language (L1) as compared to the other second language (L2) (Meyers, 2008).

Brice et al. (2009) propose an L3 for describing bilingualism-as-a-first-language, defining L3 as a continual interaction and combination of L1 and L2 that cannot be separated. Bilingualism-as-a-first-language children are more than bilingual, because they are always accessing two phonologies, two lexicons, and two pragmatic and syntactic systems, choosing which system will best convey their message while remaining in touch with both (Brice et al., 2009). It is a more specific and inclusive form of bilingualism, eliminating the question of language dominance between an L1 and L2, because both are co-dominant.

There are a number of different variations on the definition of stuttering; so too are there a myriad of definitions of “bilingual” (see Ardilla, 2007; Roberts, 2007). Both should be viewed as a continuum with periods of increased and decreased fluency rather than as isolated events; however, this phenomenon could account for the differences in results of studies examining these populations. Roberts emphasizes that the bilingualism continuum must be thought of as a continuum of ability acquired at any point in a person’s life. Bilingual speakers include individuals who are sequential or
simultaneous learners and adult acquisition or dual language learners, as well as children with bilingualism as a first language. Studies have shown differences in the language acquisition and brain processing of multilingual versus monolingual people who stutter (PWS). Balanced bilinguals have similar neural activation patterns in the language centers of the brain (Abutalebi et al., 2001). Similarly, simultaneous (balanced) versus sequential (unbalanced or dominant) bilingual speakers have their L1 and L2 centralized in different parts of Broca’s area (Myers-Scotton, 2008).

**Stuttering Patterns and the Influence of Language in Bilingual Speakers**

Stuttering is known to occur across all languages and descriptions exist of patterns in monolinguals who stutter; what does it look like in bilingual speakers? Van Borsel (2001) concluded that BWS commonly do so in both languages. For many children, difficulty forming utterances due to limited proficiency in either language can look like disfluent speech (i.e., stuttering). It may be difficult for SLPs to assess whether disfluencies arise as a product of language or disorder, especially in cases of mild stuttering. The use of key features of true stuttering can help distinguish fluency disorders in bilingual children (Watson & Kayser, 1994). These features include the following: stuttering will be present in both languages; stuttering is usually accompanied by self-awareness; and stuttering is often accompanied by secondary behaviors. Additionally, age of acquisition is paramount in accounting for the varying prevalence of stuttering in subgroups of bilingual speakers (Watson et al., 2011; Van Borsel et al., 2001). Sequence of language acquisition and proficiency of language use has been considered when examining stuttering in BWS. Specifically, Shenker (2011) asks what the effect of linguistic proficiency has on stuttering in a multilingual child.
Further, Lim (2008) states it is “unclear whether BWS stutter the same or differently in both languages” (p. 1523). She cited Nwokah (1988) who described the “same-hypothesis/different-hypothesis” where stuttering may vary across frequency, type, and loci between the two languages of a BWS (Lim et al., 2008). The influence of language proficiency on frequency and type of stuttering for balanced BWS remains inconclusive. Certain types of disfluencies favored the weaker language (L2) while others favored the dominant language (L1). Bloodstein had L2 listed as a novel mode of speech to temporarily reduce stuttering (1950). Lim’s results showed that while stuttering severity was influenced by language dominance, the type of stuttering was not.

Lim et al. (2008) examined whether the severity and type of stuttering was different in English and Mandarin in English-Mandarin adult bilinguals, and whether this difference was influenced by language dominance. Findings suggested that English dominant and Mandarin dominant BWS exhibited higher percentages of syllables stuttered (%SS) and higher severity scores in their less dominant language, whereas the scores for balanced bilinguals were similar for both languages. The difference in the percentages of %SS per Lidcombe Behavioral Data Language\(^1\) category between English and Mandarin was not markedly different for any bilingual group. Lim and her colleagues concluded that language dominance appeared to influence severity but not types of stuttering behaviors in BWS (Lim et al., 2008).

Lim and Lincoln (2011) also found that the overall stuttering profiles of individual English-Mandarin BWS included similar stuttering rates in both languages.

\(^1\) The Lidcombe Behavioral Data Language (LBDL) is an Australian behavioral system created by Onslow and colleagues to describe stuttering (Teesson, Packman, & Onslow, 2003).
for balanced BWS, whereas the unbalanced BWS (English-dominant) stuttered more in the non-dominant language. This finding supports the general conclusion that stuttering occurs more in the weaker language for bilingual speakers, suggesting a relationship between language dominance and stuttering (e.g., Lim et al., 2008; Roberts, 2011; Van Borsel, et al., 2001). It should be noted, however, that the differences between the %SS of the two languages was only 5% in the “unbalanced” language users, compared to less than 2.5% in favor of the weaker language in the “balanced” BWS.

Lim et al. (2008), Schafer and Robb (2008), and Jayaram (1983) showed that a weaker L2 can contribute to changes in bilingual stuttering due to language dominance. Contradicting evidence shows that when dealing with BWS it is paramount for analysis that the language prowess be equal; otherwise the L2 could act as a novel mode of speech, making the client temporarily more fluent in the weaker language (see Bloodstein, 1950). This issue will be avoided from either perspective in our study since we will be examining a balanced bilingual.

Identification of Stuttering in Languages Other Than Your Own

Many reports in the recent decade have examined whether or not stuttering can be identified by a person who speaks a language different from that of the person who stutters. The effectiveness and ease of stuttering identification may be impacted by stuttering severity, the SLP’s knowledge about stuttering, the SLP’s knowledge about the dialect or language and bilingualism, and the proximity between the two languages examined (Watson et al., 2011). The greater the distance between the two languages, the more difficult it is for a person to identify stuttering in an unfamiliar
language. Therefore, additional studies are necessary to provide more information about how stuttering manifests in Chinese.

Shenker (2011) cited numerous sources that discussed the variability of inter-language severity and patterns in children who stutter (see Berstein Ratner & Benitez, 1985; Cabrera & Bernstein Ratner, 2000; Roberts, 2002; Shenker et al., 1997; Van Borsel & Britto Pereiria, 2005; Watt, 2000); this occurrence can also be applied to BWS. A solution to rating stuttering in unfamiliar languages is to have inter-rater reliability checks with a second person familiar with that language, as well as discussions with the child's parents or others proficient in the child's L2 to eliminate the possibility of mistaking stuttering like disfluencies for limitations in language proficiency (Shenker, 2011).

Chinese and English Comparisons

While examining the patterns of stuttering in bilingual Mandarin–English speakers, the differences between these two languages merit consideration. Mandarin and English are structurally very different languages (Lim et al., 2008). Mandarin is a tonal language and differs from English in terms of orthography, phonology, and morphology (for a detailed analysis, see Lim Ch.3, 2011). Linguistically, Mandarin is categorized as a Sino-Tibetan language while English is considered a Indo-European language. The linguistic distance between Mandarin and English is great; hence, Mandarin-English bilingualism is considered a “strong bilingualism” (Ardila, 2011), as opposed to weaker bilingualisms between similar languages (e.g., Spanish and Italian).

Fluency is generally characterized as the smooth, uninterrupted forward flow of communication, influenced by the rhythm and rate of speech. Different languages have
different rhythmic patterns, and speech prosody also varies between languages. Tone or suprasemantics of speech, in addition to the sounds of the words themselves, communicate information. Language becomes a clinical concern when speech behaviors such as fillers, hesitations, become qualitatively different from what is considered normal; if accompanied by excessive tension or struggle behavior, they may be identified as stuttering (Owens, 2009).

When comparing Chinese and English, more differences than similarities are noted. Whereas inflection is important to English syntax and morphology to communicate meaning, in Chinese inflections are not used. Chinese also lacks plural verb markers (e.g., -s in dogs), case agreement, and tense suffixes. Chinese and English use different word orders. The two languages differ not only in how the words are arranged but in the production of the words themselves. The Mandarin phonemic inventory is much smaller than English; in Mandarin there are only two final consonants, /n/ and /ŋ/. Additionally, Mandarin does not use consonant clusters while English uses them initially and finally in words.

English and Mandarin differ especially in syllabic composition. In English, syllables can begin with up to three consonants (e.g., string or spray) and only require one vowel as an anchor (e.g., strengths, a CCCVCCCCC). Conversely, Mandarin-Chinese syllable structure has three elements: syllable initials, syllable finals, and tones (Lim & Lincoln, 2011). Tone is vital to communicating lexical meaning in Mandarin words. Mandarin has four main tones. The following chart (Figure 1) was
adapted from Lim and Lincoln (2011) and exemplifies the diversity of Mandarin tones.

FIGURE 1: Description of Mandarin Tones with Exemplars

<table>
<thead>
<tr>
<th>Tone/Description</th>
<th>Syllable</th>
<th>Word Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mandarin</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tone 1- high-level</td>
<td>ma₁</td>
<td>mother</td>
</tr>
<tr>
<td>Tone 2- high-rising</td>
<td>ma₂</td>
<td>plant</td>
</tr>
<tr>
<td>Tone 3- low-falling-rising</td>
<td>ma₃</td>
<td>horse</td>
</tr>
<tr>
<td>Tone 4- high-falling</td>
<td>ma₄</td>
<td>to scold</td>
</tr>
</tbody>
</table>

Though Mandarin uses fewer sounds, each CV syllable structure becomes a different word depending on the tone used.

Chinese and English are drastically different orthographically. Chinese words are formed using either one or more Chinese characters called logographs, representing a monosyllabic morpheme. Words can be made up of one of only one these meaningful logographs or of several logographs, each still individually meaningful (Lim & Lincoln, 2011). English words are made up of letters, and morphemes range from one letter (e.g. plural /s/) to varying combinations of letters (e.g. to and strength). Some letters carry meaning on their own (I), and some do not (p).

**Summary and Research Questions**

With various definitions of bilingualism, it is difficult to conduct comparison studies. The common characteristics of bilingualism include: fluency across languages, ease and naturalness of use, and proficiency across contexts in both languages. Balanced bilingualism and dominant bilingualism in adults have been stratified, but balanced bilingualism of bilingual children is a subgroup that is still being explored. Like stuttering, there are many different manifestations of bilingualism, and SLPs

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2 Table adapted from Lim & Lincoln, 2011.
should remember to treat both areas as a continuum when working with populations of PWS, with bilingual individuals, and with BWS. There is a need for more studies examining stuttering in bilingual speakers. Language may play an important role in influencing the outcome of stuttering patterns, especially in unbalanced BWS.

As the population of bilingual speakers in the US continues to grow, SLPs more than ever need to be able to identify and treat communication disorders in languages other than English. The universality of stuttering enables SLPs familiar with the fluency disorder to identify stuttering in languages other than their L1; however the greater the distance between the L1 and L2, the more complicated it is to identify stuttering in the SLP’s unfamiliar language. Because stuttering is known to be present in bilingual speakers as much as monolingual speakers (Van Borsel et al., 2001), SLPs will encounter clients who speak languages that they do not. Knowledge of the etiology of bilingual stuttering can help enable the SLP to better identify and treat stuttering in such populations. English and Chinese have a great language distance. Mandarin-English BWS do so in linguistically polar systems, further supporting stuttering’s universal epidemiology as a fluency disorder. With significant differences in syntax, semantics, morphology, phonology, and orthography between Mandarin and English, the manifestation of stuttering in these two disparate languages may differ as a result of the language difference. Studies of adult Mandarin-English BWS revealed more stuttering in the weaker language in unbalanced bilinguals, and similar stuttering rates for balanced speakers. For balanced BWS, no differences in stuttering types were observed. It is unknown if the same patterns observed in balanced adult BWS holds true
for Mandarin-English bilingual children who stutter, whose length of time using the languages and history of stuttering differs from adults.

In summary, stuttering is known to be a universal problem, the number of bilingual speakers is increasing world-wide (Lewis, 2009), limited information about stuttering in non-English languages is available (Van Borsel et al., 2001), and monolingual clinicians are asked to treat stuttering in non-English languages, including bilingual speakers (Li, 2004; Bebout & Arthur, 1997; Cheng 1987). Moreover, Mandarin is the number one language spoken in the world (Ardila, 2011), stuttering does exist in the Mandarin speaking population and is known to be a universal—and not language specific—problem, and English and Mandarin have a great language distance (Li, 2008). Further, stuttering can be identified in languages that may be unfamiliar to the examiner (Van Borsel, 2011; Watson et al., 2011). In adult balanced bilinguals with a history of stuttering, stuttering is still slightly more prevalent in the less dominant language. There are no known reports examining the stuttering in balanced Mandarin-English bilingual children.

The purpose of this study is to increase our understanding of stuttering in languages other than English. Specifically, we will complete a cross-linguistic comparison of stuttering in a bilingual child, XX, who speaks Mandarin and English; this study examines the influence of languages on stuttering patterns in a non-adult balanced bilingual speaker. This project endeavors to answer whether stuttering frequencies are similar in Mandarin and English in a balanced bilingual child who stutters, and whether stuttering-like and other disfluencies are comparable in the Mandarin and English of a balanced bilingual child who stutters.
Hypothesis

Specifically, our research asks the following: are disfluency rates in the connected speech in Mandarin and English in a bilingual child who stutters similar in terms of stuttering and total disfluency frequencies? Are disfluency rates in the connected speech in Mandarin and English in a bilingual child who stutters similar in terms of proportions of both stuttering-like disfluencies and other disfluencies? Are disfluency rates in the connected speech in Mandarin and English in a bilingual child who stutters similar in terms of specific disfluency types and their frequency of occurrence? Are disfluency rates in the connected speech in Mandarin and English in a bilingual child who stutters similar in terms of clustering patterns of disfluencies across both languages? It is hypothesized that, given the great linguistic disparity between Mandarin and English, disfluencies will vary between the two languages. However, based on what has been observed in balanced bilingual adults, frequencies of stuttering will be comparable in Mandarin and English for a balanced bilingual child who stutters (CWS).

METHODOLOGY

Participant

The participant, who henceforth will be referred to with client designator XX, was a simultaneous Mandarin-English bilingual with balanced language development and approximately equal time of onset of stuttering in both languages. XX, then a seven-year, two month old male (7;2) simultaneously bilingual in English and Mandarin who stutters in both languages, received treatment for a semester using the Lidcombe Program at the university clinic in 2011. The Lidcombe Program (Onslow, Packman, &
Harrison, 2003) is a behavioral treatment where parents are trained to provide verbal response contingent stimulation for stutter-free and stuttered speech. Training takes place during weekly clinic visits under guidance of the SLP and parents provide perceptual ratings of severity to track the progress of the treatment at home (Shenker, 2011). It is one of the most popular current practices for CWS, and clinical results as well as long-term efficacy studies have supported it’s validity as a best therapy practice (Lincoln & Onslow, 1997; Miller & Guitar, 2006). XX received 9 sessions of Level 1 Lidcombe treatment before his family moved to China in July 2012. Throughout this treatment, XX’s mother provided feedback in both languages at home.

XX was first brought to the university clinic by his mother, who expressed concerns about “sound and word repetitions, sound blocking, and prolongations when using both languages.” According to a modified parent questionnaire examining language use (Gutierrez-Clellen & Kreiter, 2003), Mandarin was the only language used with XX until he was 2 years old, when both languages were used in XX’s speaking environments. At the time of the study, XX lived with his mother, father, and maternal grandmother, all of whom had native-like/good proficiency in Mandarin. XX’s mother had good proficiency in English, while his father had limited English proficiency. His grandmother could neither speak nor understand English. XX was in the first grade at the time of the study and spoke only English at school. His mother reported the proportion of XX’s language use being 70% English/ 30% Mandarin during the five school days and reversed on the weekends (70% Mandarin/ 30% English). Based on a modification of the Gutierrez-Clellen parent questionnaire, XX was considered a simultaneous, balanced bilingual in Mandarin and English at therapy onset.
XX was born in the United States and lived in both China and the U.S. in his early years. His stuttering was first noted at 3;7 when the family was living in China and his language was considered by his mother as “emergent.” Stuttering onset coincided with connected speech in Mandarin and English and was present in both languages; an important hallmark for both balanced bilingualism, bilinguals who stutter, and time of onset for stuttering. Upon returning to the U.S., XX (4;3) received direct speech therapy for approximately 5 months. After re-locating within the U.S., services in XX’s (4;9) new school consisted of limited sessions, observations, and consultation services until his dismissal (6;11).

At the time of diagnostics at the university clinic (MSHC), XX had received no specialized intervention treatment (according to parent report and previous clinical reports) for his stuttering; this is especially important in considering XX’s frequency of stuttering and labeling stuttering severity without encountering changes as an outcome of previous therapy. XX’s articulation, voice, and language skills were age appropriate for a bilingual speaker and hearing was within normal limits. No formal analyses were completed in Mandarin during the evaluation. During the initial diagnostics testing at MSHC, XX exhibited awareness of his disfluencies, but no significant negative emotional reactions about speech or stuttering. Such results are typical emotional reactions for a CWS of his age (Bloodstein, 1960). These observations were also consistent with parent report of XX’s awareness.

Data Collection

At the onset and termination of his therapy at MSHC, connected speech samples of XX speaking Mandarin and English were recorded using therapy room monitors in
the Miller Speech and Hearing Clinic, as well as by XX’s mother on a personal recorder for home samples. For the purpose of this study, these lengthy digital video recordings were cut into relevant samples using Windows Live Movie Maker. Samples were separated by language, client-speaker, and context. Figure 2 summarizes the proportion of Mandarin to English, as well as measurement scales used in defining total sample size for this project.

FIGURE 2:

<table>
<thead>
<tr>
<th>Sample Language:</th>
<th>MANDARIN</th>
<th>ENGLISH</th>
<th>ALL Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (in minutes):</td>
<td>55</td>
<td>47</td>
<td>102</td>
</tr>
<tr>
<td>No. Syllables:</td>
<td>4,655</td>
<td>3,590</td>
<td>8,245</td>
</tr>
</tbody>
</table>

The English samples with a clinician totaled 3,590 intended syllables in 47 minutes and were collected during story retell and interactions while playing games. The Mandarin samples were collected with his mother using identical story retell and interaction contexts and totaled 5,242 intended syllables in 55 minutes. Total sample size was 102 minutes of connected speech and 8,245 intended syllables in 20 digital recordings selected for topic and activity comparability across Mandarin and English.

Transcription

Connected speech samples were transcribed verbatim by persons fluent in the language examined using common guidelines. The Mandarin samples were transcribed by a bilingual Mandarin-English speaker with a master’s degree in Linguistics, and the English samples were transcribed by the principal investigator. An initial training session and practice sample were completed to familiarize the Mandarin transcriber with the speech-pathology/disfluency transcription process. Weekly meetings were
held over a period of two months during which the principal investigator would clarify any sample ambiguities and answer questions to ensure the highest level of quality in the accuracy of the transcriptions.

The videos were viewed on a secure, password-protected USB drive using over the ear professional quality headphones. English samples were typed on a word processor. The Mandarin samples were hand-written. A form page was created to include sample name, utterance number and syllable count; the page was formatted as a table with separate sections for easier utterance segmentation. Due to the complexities of the language and the principal investigator’s lack of fluency in Mandarin, the following steps were used to transcribe each utterance in the Mandarin samples: four lines were used for each utterance. First, the investigator transcribed the Chinese logographs, followed by a pinyin of the Chinese syllables. Next, a literal translation of the Chinese was transcribed in English, finally followed by an abridged translation adjusted for semantic meaning of the utterance. Such procedures generated quite a large volume of paper for each sample, but were nevertheless crucial for cross-linguistic analysis by a monolingual speaker to occur. Persons responsible for completing the sample transcription and translation can be found in Appendix A, and examples of the Mandarin and English samples can be found in Appendix D.

**Disfluency Identification and Coding**

All disfluencies were identified and coded in all 20 samples. In addition, total numbers of syllables per sample were identified. Specifically, disfluent moments were coded as stuttering like disfluencies (SLDs) and other disfluencies (ODs) using common
guidelines as defined by Campbell and Hill (1987) and Yairi and Ambrose (2005). Figure 3 exemplifies the specific disfluencies that were identified in the samples.

FIGURE 3: Specific Disfluency Types

<table>
<thead>
<tr>
<th>Other Disfluencies (OD)</th>
<th>Stuttering-Like Disfluencies (SLD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interjection</td>
<td>Sound repetition</td>
</tr>
<tr>
<td>Revision</td>
<td>Syllable repetition</td>
</tr>
<tr>
<td>Phrase repetition</td>
<td>Block</td>
</tr>
<tr>
<td>Single-syllable whole word repetition w/o tension (x &lt; 3 iterations)</td>
<td>Single-syllable whole word repetition w/ tension</td>
</tr>
<tr>
<td>Grammatical pause</td>
<td>Prolongation</td>
</tr>
<tr>
<td>Ungrammatical pause</td>
<td></td>
</tr>
<tr>
<td>Unfinished word</td>
<td></td>
</tr>
<tr>
<td>Incomplete Phrase/ Abandoned Utterance</td>
<td></td>
</tr>
</tbody>
</table>

The principal investigator completed this analysis in the English samples. An ASHA\(^3\) certified Mandarin-English bilingual speech-language pathologist familiar with stuttering was trained to complete the coding of SLDs and ODs in the Mandarin samples (see Appendix A.) The investigators met in Fort Worth and in Austin to complete the training and NIH certifications, after which samples were mailed back and forth and communications were primarily email-based. The following table enumerates all disfluencies that could have occurred in the samples. Secondary behaviors or changes in pitch were not coded.

**Collaboration Considerations**

Because the various components of transcription, coding, and inter and intra rater reliability required the work of five different people with varying levels of experience with stuttering, speech-language pathology, and related transcription procedures and guidelines, the principal investigator and supervisor compiled an

---

\(^3\) American Speech-Language-Hearing Association (ASHA) is the national professional, scientific, and credentialing association for more than 166,000 members and affiliates who are audiologists, speech-language pathologists, speech, language, and hearing scientists, audiology and speech-language pathology support personnel, and students.
agreed-upon list of disfluency codes and decided what would qualify as an utterance for each code, based on the previously stated common guidelines by Yairi and Ambrose (2005) and Campbell and Hill (1985). These guidelines were created and used during training for transcription and coding so that all persons listed in Appendix A were working using the same rules, providing consistency across all samples.

Using standard written transcription and coding rules proved to be a necessity, because several discrepancies arose during identification of intended syllables and disfluent intended syllables for inter-judge reliability. Without clarification, the matched reliability percentages would have been skewed to the left. The following addendums were agreed upon by the group for the samples discussed: 1) If the word can stand alone, it should be counted as an intended syllable. For example, “Oh” is in exclamation and can stand on its own. “Well, like, you know” are interjections and act as fillers but have semantic significance so they should be coded as disfluent but underlined as intended. 2) Sounds that do not make words or that act as fillers should be counted as interjections, as well as words that serve as fillers but do not contribute directly to the intended utterance. 3) Exclamations do not equal interjections.

Coding Reliability

In order to assure consistency of coding in both English and Mandarin, reliability checks for Mandarin samples were completed by a second ASHA certified bilingual Mandarin-English SLP. The purpose of this procedure was to determine coding consistency both within and between language samples through confirmation by comparable agreement rates. Inter-judge and intra-judge reliability was estimated for
the presence or absence of disfluency, whether the disfluency present was an OD versus SLD, what specific disfluency type was coded, and if the disfluent event contained multiple disfluencies, the number of disfluencies in clusters. Inter-judge tasks in Mandarin were completed by the second bilingual SLP and in English by a speech-language pathology graduate student. The judges reviewed 20% of a randomly selected portion of the recordings. Copies of the original unmarked transcriptions were provided along with the coding guidelines and re-coded. Percentages of agreement ranged from 72% to 90% in English and 68% to 95% in Mandarin, as seen in Figure 4.

**FIGURE 4:**

<table>
<thead>
<tr>
<th>Coding Reliability Percentages</th>
<th>English</th>
<th>Mandarin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raters</td>
<td>Inter</td>
<td>Intra</td>
</tr>
<tr>
<td>Disfluency is Present/Absent</td>
<td>72%</td>
<td>93%</td>
</tr>
<tr>
<td>Categorized as OD or SLD</td>
<td>90%</td>
<td>97%</td>
</tr>
<tr>
<td>Specific Disfluency Type Labeled</td>
<td>81%</td>
<td>99%</td>
</tr>
<tr>
<td>No. of Disfluencies in Clusters</td>
<td>73%</td>
<td>91%</td>
</tr>
</tbody>
</table>

Intra-judge tasks in Mandarin and English were completed, respectively, by the first bilingual Mandarin-English SLP and the principal investigator using the same procedures discussed for inter-judge reliability. Percentages of agreement ranged from 91% to 99% in English and 84% to 97% in Mandarin.

**Analysis**

The principal investigator collected information about the observed disfluent events in terms of each of the parameters listed in the research question for the English samples, and used the disfluencies coded by the first bilingual SLP to collect data for the same parameters in Mandarin. The principal investigator then compiled information
about all disfluencies across all samples (see Appendix D) and described and compared the disfluency patterns within and between both languages (sees Appendix B).

Descriptive statistics were completed for the following measures were obtained for Mandarin and English: frequencies of total speech disfluencies and stuttering-like disfluencies; proportions of stuttering-like and other disfluencies; frequencies of specific disfluency types; and frequencies of two, three, four and five or more clusters during disfluent events. English disfluencies occurring from code-switching in the Mandarin samples were not included in the results, but could be addressed in an additional study at a future time.

RESULTS

Frequency of Stuttering-Like and Total Disfluencies

The first question considered whether stuttering and total disfluency frequencies would be similar in Mandarin and English for a balanced bilingual child who stutters. For XX, the frequencies of both total disfluencies and stuttering-like disfluencies in the English samples were double what were observed in the Mandarin samples. Percentages of total disfluencies were obtained using total number of disfluencies over total number of intended syllables for all samples. Percent of stuttering-like disfluencies were obtained using total SLDs over total intended syllables. Measurements such as percent disfluent syllables and percent syllables stuttered (%SS) provide a holistic overview of XX’s stuttering in the context of his connected speech and answers the questions does he stutter? and how much does he stutter?.

All tables and figures described in the Results section can be found listed in the order in which they are discussed in Appendix B.

SEE FIGURE 6: Percentage of Stuttering-Like and Total Disfluencies.
In English, 11% of XX’s intended syllables were disfluent; 4% of intended syllables were stuttering-like disfluencies and 7% were other disfluencies. Disfluencies occurred half as often in the Mandarin samples. Five percent of his intended Mandarin syllables were disfluent, and of those only 2% of intended syllables were stuttering-like. Because XX is presumed to be a balanced bilingual speaker, an average of both languages is included. For both languages, 8.6% of XX’s total intended syllables were disfluent and 3% were stuttering-like disfluencies. The percentages found in this study are consistent with XX’s 8.2 %SS obtained during MSHC diagnostics.

**Proportions of Other Disfluencies and Stuttering-Like Disfluencies**

The second parameter examined was whether proportions of SLDs and ODs would be similar in Mandarin and English for a bilingual CWS. Proportions of other disfluencies and stuttering-like disfluencies were similar in both English and Mandarin. In English, 67.1% of XX’s disfluencies were other disfluencies, and 32.9% were stuttering-like. Similarly, 66.3% of XX’s disfluencies in Mandarin were other disfluencies, and 33.3% were stuttering-like disfluencies. Therefore, with minute percentage variations, proportions were comparable across both Mandarin and English.

**Specific Disfluency Types**

The third and most extensively detailed parameter examined the frequency of specific disfluency types in Mandarin and English, and whether the disfluencies that occurred would be similar and occur in comparable frequencies across both languages. Percentages of specific disfluency types were similar in English and Mandarin for both

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6 SEE FIGURE 7: Proportions of SLDs and ODs in Mandarin and English.
ODs and SLDs with the exception of the following: more interjections, revisions, and syllable revisions in English; more prolongations and blocks in Mandarin\(^7\).

Specific disfluency percentages were categorized into three ranked levels: those occurring across all samples in Mandarin and English 10% or more, those that comprised 5-10% of all disfluencies across all samples, and those that made up less than 5% of the disfluencies that were present.

Rankings in Mandarin and English are very similar in most and least frequent behaviors across all samples. Notably, frequencies of most commonly occurring disfluencies included similarities in other disfluencies as well as stuttering-like disfluencies, including: interjections, monosyllabic whole word repetitions without tension, phrase repetitions, revisions (OD), and monosyllable whole-word repetitions with tension (SLD). These results comprised three quarters of all disfluencies in occurrence across both English and Mandarin samples. In the Mandarin samples, the middle-ranked disfluencies were mostly stuttering-like, including prolongations, sound repetitions, and blocks. Mandarin and English matched only in frequency of sound repetitions for this category, with most differences occurring in the middle range of frequencies of occurrence. The languages matched again for least frequently occurring disfluencies, including unfinished words and polysyllabic whole word repetitions.

Discrepancies between the Mandarin and English disfluency frequencies were most interesting for blocks and prolongations—two stuttering-like disfluencies that fall into a broader category called dysrhythmic phonations (see Campbell & Hill, 1986).

\(^7\) SEE FIGURE 8a: Specific Disfluency Types: SLD, FIGURE 8b: Specific Disfluency Types: OD, FIGURE 9: Rankings of Specific Disfluency Percentages in Mandarin and English Across All Samples.
These (9% blocks, 5% prolongations), in addition to OD monosyllabic whole word repetitions without tension (8%), had frequencies in Mandarin double to those observed in English (4% blocks, 0.5% prolongations, 4% MWT w/o T, respectively)\(^8\).

**Disfluency Clusters**

Finally, the last parameter examined was whether percentages of disfluency clusters would be similar in Mandarin and English for a bilingual CWS. Of the percentages of disfluencies in cluster types in all samples, twice as many clustering events were observed in English as in Mandarin\(^9\). English samples had 9% of clustering events occur in groups of 2 clusters (e.g. block + revision, sound repetition + interjection)\(^10\) whereas the same event occurred only 4% of the time in Mandarin. Additionally, English samples contained clustering events of three, four, and five or more disfluencies in a single cluster, a pattern which barely occurred in Mandarin. Such a pattern suggests that XX’s English had not only a larger volume of clustering events than his Mandarin, but also more complex difficulties occurring with individual disfluent events.

**Discussion**

Normative data suggests that for a child who stutters approximately 66% of all disfluencies are stuttering-like, while only 28% of all disfluencies are stuttering-like disfluencies for children who do not stutter. XX is known to be a CWS, but his proportions are reversed in comparison to normative data. While he does not exactly mirror what CWDNS do, these proportions suggest that his disfluencies are becoming

\(^8\) All percentages were taken from proportions listed in FIGURE 9: *Rankings of Specific Disfluency Percentages.*

\(^9\) SEE FIGURE 10: *Disfluency Clusters*

\(^10\) For an example of how a disfluency cluster would appear in context, see FIGURE 12 for an excerpt of the Mandarin samples (Appendix D).
more typical (or non-stuttering-like) and may be a reflection periods of increased language learning and language loss associated with the continuum of bilingualism. Adult bilinguals who stutter have a history of stuttering patterns and language use; bilingual children who stutter lack both of these histories and therefore their percentages may have greater movement until these histories solidify with age.

It should be noted that the unusually high occurrence of Mandarin monosyllabic whole word repetitions with tension may be attributed to inflation as a result of the syllabic nature of the language. As discussed in the literature review, Mandarin and English differ drastically across multiple linguistic parameters, including syllabicity. Due to the nature of the tones and logographs (Lim & Lincoln, 2011), a single syllable is a whole word for Mandarin; English has single syllable whole words but also contains base morpheme groups of up to five syllables, with some words containing even more once additional morpheme modifiers are included. Therefore, since all words in the Mandarin samples were monosyllabic, it is to be expected that a higher incidence of monosyllabic whole word repetitions with tension (MWR w/T) would occur in Mandarin than in the English transcripts.

The monosyllabic nature of Mandarin also accounts for the scant occurrence of syllable repetitions in Mandarin when compared to English. Sound and syllable repetitions are also known as part word repetitions; because English has more multisyllabic words, it makes sense that there would be more syllable repetitions (part word repetitions) compared to Mandarin, where a single syllable constitutes an entire word. Although MWR w/T comprised 18% of all SLDs in Mandarin and syllable
repetitions (SyR) only 1%, when compared to the combination of 24% SLDS being either SyR (10%) or MWRw/T (14%) in English, the frequency of occurrence is consistent with other disfluency patterns for both languages. In other words, once linguistic variation is accounted for, the percent occurrence of disfluencies occurring on syllables are comparable for English and Mandarin. The slightly higher percentage in English is consistent with the greater complexity of XX’s disfluencies in English than in Mandarin.

XX’s disfluencies were more complex in English than in Mandarin, as evinced by the significantly higher percentage of disfluencies in clusters as well as the fact that percentages of total disfluencies and total stuttering-like disfluencies in English were double that of those in Mandarin.

CONCLUSION

Summary of Findings and Implications

The connected speech of XX, a balanced bilingual school-age child who stutters in Mandarin and English, was examined in the context of the proposed research question to determine whether disfluency rates, including stuttering and total disfluency frequencies, frequency of specific disfluency types, disfluencies occurring in clusters, and proportions of SLDs and ODs, would be similar across both languages for a bilingual CWS.

Disfluency patterns of a balanced bilingual child demonstrated both similarities and differences in English and Mandarin. XX was more disfluent in English than he was in Mandarin. In addition, his stuttering, as indicated by clusters of disfluencies, was more complex in English. Further, although the proportions of other and stuttering-like
disfluencies were similar in both languages, more revisions, interjections, and syllable repetitions were observed in English and more blocks and prolongations were observed in Mandarin. This finding may reflect the polar syllabic nature of the two languages as well as language learning in XX.

These findings suggest that a balanced bilingual child who stutters may not look like a balanced bilingual adult who stutters. Results suggest that children who stutter who are presumably balanced in their language use, unlike adult BWS (Lim et al., 2008), may have differences in both stuttering severity and disfluency types across English and Mandarin. These differences may reflect language learning and a history of stuttering in both languages. Future studies should consider: contextual influences in samples, the influence of treatment on stuttering rates, methods of identifying the speaker’s proficiency in both languages, and the challenges associated with the perceptual analysis of stuttering by both monolingual and bilingual clinicians. Additional cross-linguistic studies are needed to improve clinicians’ abilities to identify and track stuttering rates in bilingual children who stutter.

XX’s disfluency results suggest that for a bilingual Mandarin-English child who stutters the disfluency patterns may not look like those of a bilingual adult who stutters. We can therefore conclude that CWS who are presumably balanced in language use do not match stuttering patterns of adult BWS. Clinicians working with this population should be cautious about relying on language use alone to determine a child’s bilingual language proficiency.

Because of the variance between the observed behaviors of adult BWS and children BWS, the role of language learning in BWS merits consideration. Although XX
had balanced language use, and Mandarin was his first learned language, more disfluencies were present in English than in Mandarin. As a school-age child, XX used his English more frequently throughout the week, and although his proficiency was equivalent across both languages, his language learning was still in flux and stuttering patterns still developing. At the time of the study, XX had doubled frequencies for English than Mandarin; should XX’s daily Mandarin use increase the proportions could easily switch to the opposite end of his language spectrum, and Mandarin disfluencies would occur more frequently than those in English. The clinician should therefore be careful not to confuse stuttering-like disfluencies and disfluencies associated with language learning.

**Limitations and Future Research**

In looking at these results, there are a number of issues that may have impacted the findings and should be considered in future studies. First, results may have been affected by contextual influences. Differences across variables such as interaction versus story retelling, clinician versus mother, and task familiarity with pre and post treatment samples may have influenced the frequency of XX’s stuttering as a result of different conversational contexts. A second variable impacting the findings and the disfluencies in pretreatment and post treatment samples may be differential rates of improvement in English and Mandarin. XX’s improvement as a result of treatment may not have been equal in both languages. A third consideration is the understanding language proficiency and use in bilingual populations. Utterance length and linguistic complexity has been found to influence stuttering behaviors in both English and Spanish speakers (e.g., Watson, et al., 2011) and may have affected XX’s stuttering rates
in both his English and Mandarin samples. Bilingualism is a continuum (Ardila, 2011; Lim, et al., 2008) and measurements are accompanied by various complexities; variables such as frequency of stuttering-like disfluencies and other disfluencies are complex to measure across different languages, especially those with a significant linguistic distance (such as Mandarin and English).

Finally, the results may have been impacted by challenges associated with perceptual identification of disfluencies in Mandarin. Intra- and inter-judge reliability for identifying a disfluent syllable was lower in Mandarin. It is unclear if this is related to differential abilities to note disfluent speech or to increased difficulties in identifying disfluencies in Mandarin. Differences could have occurred as a result of having two different people transcribe and code the samples. An ideal research study would be completed by a single person fluent in both languages examined and able to complete all transcriptions and identification and interpretation of disfluencies. Since our study was required a minimum of four persons with various training backgrounds to transcribe, code, and complete inter- and intra-rater checks, it was expected to see a certain level of variability across percent accuracy of matched inter-rater samples. Standard procedures were already in place for English inter-rater samples, and lower percent matches occurred at the first level of coding reliability—whether a disfluency was present or absent. These results could be lower due to different interpretations of the rules used; specifically, one rater did not mark any ungrammatical pauses (UP) at all, thus inflating the percent error for this rating. The fourth level (number of disfluencies in clusters) was dependent on earlier match agreement, and was therefore affected by any previous match errors concerning
specific disfluency type or presence/absence of a disfluency. It should be noted that the majority of match errors occurred on identification of Other Disfluencies, not Stuttering-Like Disfluencies.

The highest percent of match error occurred between the Mandarin inter-raters. This could be attributed to several causes: firstly, that the two inter-raters were in separate cities (Dallas and Austin) and were trained at different times due to their locations. Secondly, as with the English inter-raters, disagreements occurred on the presence or absence of a disfluency. Since our procedures for the Mandarin tasks were new—due to the preliminary nature of the study as a result of the lack of research with this specific population—Figure 11 (Appendix C) shows exactly where the disagreements occurred between the Mandarin inter-raters. As with the disagreements in the English samples, the majority of coding disagreements were in identification of ODs; so even though the rate of error appears inflated, the error with agreement of SLDs was extremely small.

Future studies should consider all of the issues discussed in this section when examining sample populations of bilingual persons who stutter. Although this was a preliminary study, XX’s disfluency patterns presented interesting results that, with additional research and replication studies, may provide meaningful clinical implications for understanding stuttering patterns in bilingual children who stutter in linguistically polar languages.
APPENDIX A

FIGURE 5: Table of all Investigators and Persons Involved in Transcription, Identification, and Analyses for Both Languages.

<table>
<thead>
<tr>
<th>Languages</th>
<th>Task</th>
<th>Transcription</th>
<th>Translation</th>
<th>Identification/Coding</th>
<th>Data Input</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Original</td>
<td>Original</td>
<td>Original</td>
<td>Reliability</td>
<td></td>
</tr>
<tr>
<td>Mandarin</td>
<td></td>
<td>Bilingual RA</td>
<td>Bilingual RA</td>
<td>Bilingual SLP1</td>
<td>Bilingual  SLP 2</td>
<td>TH</td>
</tr>
<tr>
<td>English</td>
<td></td>
<td>TH</td>
<td>Monolingual RA</td>
<td>--</td>
<td>TH</td>
<td>Bilingual SLP 2</td>
</tr>
</tbody>
</table>

RA= Research Assistant

TH= Principal Investigator, SLP undergraduate student (Fort Worth, Tx)

Monolingual RA= SLP graduate student (Fort Worth, Tx)

Bilingual RA= Non-SLP bilingual Mandarin-English speaker with a master’s degree in Linguistics (Fort Worth, Tx)

Bilingual SLP 1= ASHA certified bilingual Mandarin-English SLP (Austin, Tx)

Bilingual SLP 2= ASHA certified bilingual Mandarin-English SLP (Dallas, Tx)
APPENDIX B

The following graphs, tables, and figures correspond with the results section (p 21-25).

FIGURE 6: Percentage of Stuttering-Like and Total Disfluencies in Mandarin and English.

<table>
<thead>
<tr>
<th></th>
<th>Total Disfluencies</th>
<th>% Total Disfluencies</th>
<th>Total SLDs</th>
<th>% SLDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>398</td>
<td>0.111</td>
<td>131</td>
<td>0.04</td>
</tr>
<tr>
<td>Mandarin</td>
<td>240</td>
<td>0.052</td>
<td>80</td>
<td>0.02</td>
</tr>
<tr>
<td>Total</td>
<td>705</td>
<td>0.086</td>
<td>211</td>
<td>0.03</td>
</tr>
</tbody>
</table>

FIGURE 7: Proportions of SLDs and ODs in Mandarin and English.
FIGURE 8a: Specific Disfluency Types in both Languages: SLD

Percentages of Stuttering Like Disfluencies

FIGURE 8b: Specific Disfluency Types in both Languages: OD

Percentages of Other Disfluencies
FIGURE 9: Rankings of Specific Disfluency Percentages in Mandarin and English across All Samples (n=701 disfluencies).

<table>
<thead>
<tr>
<th>English</th>
<th>Mandarin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interj</td>
<td>0.432</td>
</tr>
<tr>
<td>Rev</td>
<td>0.249</td>
</tr>
<tr>
<td>MWR w/T</td>
<td>0.143</td>
</tr>
<tr>
<td>PhR</td>
<td>0.136</td>
</tr>
<tr>
<td>SyR</td>
<td>0.098</td>
</tr>
<tr>
<td>SdR</td>
<td>0.088</td>
</tr>
<tr>
<td>P</td>
<td>0.045</td>
</tr>
<tr>
<td>MWR w/o T</td>
<td>0.038</td>
</tr>
<tr>
<td>UnfWd</td>
<td>0.033</td>
</tr>
<tr>
<td>IncP/AbUt</td>
<td>0.025</td>
</tr>
<tr>
<td>B</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

< 5% 5 - 9% > 10%
FIGURE 10: Disfluency Clusters in English and Mandarin.
APPENDIX C

The figure below accounts for the lower percent of inter-rater agreement (68%) for Mandarin samples. Orange represents the types of SLDS and grey the types of ODs. The majority of coding disagreements were in identification of other disfluencies, specifically revisions (6 disagreements). So even though it looks like the disagreement rate was high, only two stuttering-like disfluencies (1 P and 1 MWRw/T) did not match between the two recoded samples; it important to note that although the inter-raters differed on specific type of disfluency that they were still able to agree on what was considered stuttering with very high accuracy.

FIGURE 11: An Approximation Distribution of the Proportion of Disagreements between SLDs (orange) and ODs (grey).
APPENDIX D

The following are examples of the data collection and transcription formats used for this investigation.

Mandarin Sample


Mandarin.TH.02032013.

The above is an example of a single Mandarin utterance. The samples share the C/M markers for child/mother utterances, as well as chronological numbering. Code switching occurred in the Mandarin samples as seen above, but any disfluencies that occurred when XX code switched were not included in the total disfluency count. The
Mandarin transcripts were composed of four pieces per utterance: Chinese logographs, pinyin, literal translation, and semantic meaning/glossed translation. Disfluencies were marked above the pinyin so that the principal investigator, a monolingual English SLP student, would be able to see the syllables and sounds on which Mandarin disfluencies occurred. This sample also shows an example of what a disfluency cluster looks like. Total syllable counts are included to the right of the utterance.

**English Sample**

FIGURE 13: Utterances 84 and 85 from pre-treatment transcript `EL.01232012

*Diagnostic 1of2.MTS.Clinician-Child Interaction (playing Trouble).clinic.English.*

*TH.02192013.*

In the English samples, each utterance is placed on a separate line, and syllable or sound repetitions are placed in a maze. C and Cl markers represent child and clinician utterances, and samples were transcribed verbatim. XX’s utterances are numbered in order for ease of reference. The intended syllables are underlined and disfluencies coded above the utterance. The number of disfluent syllables over total intended syllables is recorded to the side of the utterance.
Data Collection Method

All disfluent events were catalogued in excel spreadsheets and categorized by disfluency characteristics such as specific type, SLD or OD, and number of iterations and clustered events, context, and language. Contexts were coded as Interaction (1)
Languages were coded with yes (1), 2 (no), and all other categories used either did not occur (0) or did occur (1).
Transcript and Utterance number of each disfluent event were noted for ease of reference to the original transcripts.
LIST OF REFERENCES


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edition. Dallas, TX: SIL International. Online version:


Fluency Disorders, 31(3), 165-176.


ABSTRACT

This preliminary study was a cross-linguistic analysis of the speech disfluencies of a Mandarin-English speaking school-age child who stutters (chronological age 7;2), who was considered to be a simultaneous, balanced bilingual speaker. This case study answered the question, *are disfluency rates in the following areas similar in Mandarin and English in a bilingual child who stutters: stuttering and total disfluency frequencies, proportions of stuttering-like and other disfluencies, specific disfluency types, and disfluency clusters?* Digital video recordings of the participant’s connected speech in both languages were recorded at onset and termination of therapy. Samples in English with a clinician (2590 intended syllables; 47 minutes) and Mandarin with his mother (5242 syllables; 55 minutes) were collected during story retell and interactions while playing games. Disfluencies were coded by a bilingual Mandarin-English SLP and the author, and inter- and intra-judge reliability was completed for 20% of randomly selected portions of the recordings. Stuttering-like, clusters, and a variety of disfluency types were present in both languages, and frequencies of these behaviors were compared in Mandarin and English. Results are discussed in terms of possible linguistic and contextual influences.